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biomedicīna / *biomedicine*

LV

Pastāstiet, lūdzu, kādā jomā strādājat.

Zinātnē strādāju kopš 1968. gada. Beidzu medicīnu, bet jau no ceturtā kursa mani vairāk interesēja teorija. Nožēloju, ka neaizgāju biofizikā. Pēc studiju beigšanas veicās iestāties doktorantūrā pie profesora Jāņa Ērenpreisa, kas toreiz bija liels teorētiķis molekulārajā bioloģijā, vēža izcelsmes teorijās. Man ļoti patika strādāt viņa laboratorijā, vēlāk iemīlējos un mēs apprecējāmies. Jānis jau divdesmit gadus ir miris. Mums bija kopīga interese par teoriju. Viņa māte agri mira no vēža, viņš ļoti gribēja savas dzīves laikā saprast tā pamatus. Sākumā mēs domājām, ka to sapratīsim, izprotot, kā strukturēts šūnas kodols. Veltījām tam ilgu laiku, aizstāvēju divas disertācijas par vēža šūnām. 1993. gadā Jānis uzrakstīja savu pēdējo grāmatu par vēzi un pēc trīs gadiem nomira. Tas bija grūts laiks, bet Dievs man piespēlēja labus kolēģus. Izmisīgi meklēju iespējas kaut ko darīt ārzemēs, sāku braukāt uz Angliju, saņēmu stipendijas. Nejauši kādā konferencē iepazinu divus jaunus angļus, kuri rādīja neparastas lietas par ārstētu vēzi. Mani interesēja, kas tas ir, vai viņi zina, kas notiek ar šūnām. Esmu mikroskopists, man jāredz. Grafiki, tas tā. Man jāredz. Nē, viņi nezināja. Es viņiem teicu, lai dod tos preparātus izpētei. Viņi deva, un es uzgāju dažas neparastas idejas. Tā sākās mūsu sadarbība.

Could you please describe the broader field of your research?

I have worked in science since 1968. I graduated in medicine, but from the fourth year onwards, I was more interested in theory. I regret not studying biophysics. After completing my studies, I was lucky enough to be admitted to the doctoral programme under Professor Jānis Ērenpreiss, who, at that time, was a major theoretician in molecular biology and in theories of the origin of cancer. I really enjoyed working in his laboratory, later fell in love, and we married. Jānis died 20 years ago. We had a shared interest in theory. His mother died young from cancer; he very much wanted to understand its fundamentals in his lifetime. At first, we thought that we would understand it by understanding how the nucleus of the cell is structured. We devoted long years to this. I defended two theses on cancer cells. In 1993, Jānis wrote his last book about cancer and died three years later. That was a difficult time, but God blessed me with good colleagues. I desperately sought opportunities to do something abroad; I travelled to England and received grants. Quite by chance at a conference, I met two young Englishmen, who were presenting unusual findings about treated cancer. I was interested in them. Could it be the case

Attīstījās vesels pētījumu lauks, desmit gadu laikā mūsu atklājumi tika atzīti un pierādīti par spīti grūtībām. Iedziļinoties, nonācu pie evolūcijas, sapratu, kāpēc vēža šūnas ir tādas un no kurienes tās nāk. Ja vēzi uzskatītu par kādu iekodētu programmu, kas var ieslēgties mutāciju, piesārņojuma, stresa gadījumos un īpaši vecumā, tad tā ir aizgūta, gēnos iesaldēta pirms apmēram 600-640 miljoniem gadu. Tad lielākoties ūdenī dzīvojošie viensūnas organismi sāka veidot sarežģītākus daudzšūnu organismus. Šajā pārejas posmā radās šūnas ar daudziem kodoliem. Tām ir kolosālas adaptācijas spējas un tieksme veidot vēža šūnas. Tās pierod pie iradiācijas, ķīmijas, stresa, pārkaršanas utt.

Pie kā strādājat šobrīd?

Šobrīd sadarbojos ar diviem profesoriem Savienotajās valstīs – mediķi un citoģenētiķi, vienu enciklopēdistu Itālijā un diviem japāņiem. Nupat biju arī Izraēlā pie viena gudrinieka. Sistēmiskā domāšana ir relatīvi jauna, kaut tās saknes ir aizpagājušajā gadsimtā, tajā, ko sauca par natūrfilozofiju. Kad redzi dabu kā vienu veselu un jāsaprot tās likumības. Ja izmainīsi vienu elementu, mainīsies viss. Interesantā veidā tas viss mani aizved atpakaļ pie kodola struktūras. Tā ir tāda

that they knew what happened to cells? I'm a microscopist; I must see for myself. Graphs are not as important. I must see for myself. No, they did not know. I asked them to submit their findings for further study. This they did and I discovered a few unusual ideas. Thus, began our collaboration. A whole field of studies developed. Over a decade, our discoveries were recognised and proven despite the difficulties. Studying in-depth, I arrived at evolution and came to understand why cancer cells are the way they are and where they come from. If cancer were to be considered as an encoded programme, which can latch on in cases of mutations, contamination, stress, and particularly in old age, then it originated, frozen in genes, about 600-640 million years ago. Back then, the majority of single-cell organisms living in water began to form more complicated multi-cell organisms. During this transitional period, cells were created with many nuclei. They have colossal adaptation abilities and the tendency to form cancer cells. They become accustomed to radiation, chemicals, stress and overheating, etc.

What are you currently working on?

Right now, I'm collaborating with two professors in the United States: a phy-

aizraušanās. Pašlaik esmu tur.

Varu teikt, ka Padomju Savienībā nebija slikta zinātne, bet mēs bijām izolēti. Krievija, starp citu, joprojām zinātnes jomā ir relatīvi izolēta. Bija ļoti grūti, izdarot ko vērtīgu, to publicēt tikai vietējos žurnālos, no kuriem par to neviens neuzzinās. Bija arī bailes un mazvērtības kompleksi, ko es zināmā mērā pārvarēju, publicējoties Austrumvācijas žurnālos. Tagad pārdzīvojam jaunu, ļoti smagu periodu. Esam brīvā pasaulē un ir jākonkurē ar visiem. Nevienu neinteresē, ka esam no nabadzīgas valsts un trūkst naudas publikācijām. Nu, nepublicē. Bet latīņa jāliek augstu un jāriskē. Tās nav personas ambīcijas kļūt pazīstamam ar savu veikumu. Jauniem cilvēkiem tas ir svarīgi, man šbrīd ne. Bet es smagi strādāju. Un zinu, ka pirmajos divdesmit gados veiktais praktiski tika apglabāts, jo netika pienācīgi publicēts. Tāpēc jāsaprot, ja strādā, tad jādara viss, lai tavs darbs tiktu arī izmantots.

Kā jūsu darbs attiecas uz pārējiem, ar zinātņi nesaistītajiem cilvēkiem?

Es nenodarbojos ar vēža ārstēšanu. Es gribu saprast, kāpēc vēzis ir faktiski neizārstējams. Vai atrast, kur vēl uz to var mēģināt iedarboties. 1971. gadā Niksons

sician and a cytogeneticist, an encyclopaedist in Italy and two Japanese. I recently visited a clever man in Israel. Systemic thinking is relatively new, even though its roots date back to the 19th century, in what was known as nature-philosophy. When you see nature as a totality and have to understand its laws. If you change an element, everything will change. Interestingly, this all leads me back to the structure of the nucleus. It's a bit of a passion with me. Currently, that's where I am.

What I can say is that science in the Soviet Union wasn't bad, but we were isolated. Russia, by the way, is still relatively isolated in the field of science. It was very difficult, doing something valuable, to publish it only in local magazines from which nobody would ever find out about it. There was also fear and inferiority complexes, which I overcame to a certain extent by being published in East German magazines. Now, we are surviving a new and very difficult period. We are in a free world and now we have to compete with everyone. Nobody is interested in the fact that we come from a poor country and that we lack money for publications. So what, don't publish. But you have to set high standards and take the risk. It is not my personal ambition to become well-known through my

pasludināja karu pret vēzi, izgāza milzu līdzekļus pārlicībā pēc pieciem desmit gadiem uzvarēt. Mēs turpat vien esam. Pamazām izveidojās plašs sakaru loks pasaulē. Tā kā mani “velk” uz fiziku, uz teoriju, tad izjutu gnozeoloģisku sadursmi starp zinātnisko domāšanu, kas prevalēja kopš piecdesmitajiem gadiem, un to domu, kas bija pirms tam un nu pamazām atgriežas. Nosacīti tās var apzīmēt kā “elementārismu” un “sistēmismu”. Vieni uzskata, ka pietiek atrast īsto elementu, lai atrisinātu problēmu. Otri uzskata, ka jāsaprot sistēma. Šobrīd pat vadoši vēža pētnieki, kuri saņēma bagātīgus grantus Amerikā, atzinuši grēkus. Viņi pirms pensionēšanās publicēja divus rakstus. Vienu vislabākajā žurnālā *Cell*, otru – *Nature*, kur atzina, ka vēzis ir pārāk sarežģīts un mēs to nenovērtējam. Faktiski visam terapijas gājienam, kas balstās uz elementiem un kam kāri seko farmakoloģijas firmas, jo tā ir “money, money”, rezultāta nav. Vēzis ir par sarežģītu. Tas lika saprast, ka nav melns un balts, vienmēr ir nenoteiktība. Un metastabilitāte, spēja pāriet no vienas fāzes citā un uzkavēties starpstāvoklī ir galvenā vēža bioloģiskā īpašība. Vai jums tas liekas interesanti? Man tas šķiet ļoti interesanti. Jāatzīst, ka to sapratu jau studiju laikā. Tas vienkārši ir domāšanas veids.

work. This matters to young people, but, right now, not to me. But I work hard. And I know that the work I did in the first 20 years was practically buried, because it was not published properly. Therefore, you have to understand; if you work, you have to do everything so that your work is utilised.

How does your work relate to people who are not involved in the scientific community?

I'm not involved in treating cancer. I want to understand why cancer is, in fact, untreatable. Or to find out where else one can try to impact it. In 1971, Nixon declared a war on cancer and spent a huge amount of money in the belief that it could be beaten in five or ten years. We're still in the same place. A wide global network is gradually taking shape. Since I'm drawn to physics, to theory, I sense an epistemological clash between the scientific thinking that prevailed 50 years ago and the thought that existed before that and is now slowly making a comeback. In relative terms, these could be described as “elementarism” and “systemism”. One [...school of thought] believes that it's sufficient to find the real element to solve a problem. The other believes that you have to understand the

Kādas, jūsuprāt, ir attiecības starp analītiskām, racionālām spējām un intuīciju, radošu darbu zinātnē?

Kāds gudrais teicis, ka atklājums atrod sagatavotu prātu. Veiksme pati par sevi nenotiek. Grantu konkurss, kur pieņems piecus procentus, gan protams, ir loterija. Bet radošais, pēdējos desmit gados es no tā praktiski nezeju. Pirms tam... trīs bērni, ģimene, bet tagad pilnībā nododos radošam darbam. Pamostos ar domu, pie kā strādāju. Risinājumus nenosapņoju, bet tie mēdz nākt no rītiem. Nezinu, ko jūs saucat par analītisku, bet atklājums nevar rasties bez emocionāla ieguldījuma. Pat ļoti liela. Nezinu, kā tas ir fizioloģiski, bet jābūt augstam fonam, uz kura domai pakāpties. Ja fona nav, doma būs sīkāka.

Man ir izveidojusies sava rīta rosme. Pieceļos un sēžos pie datora. Šoferis brauc pakaļ pusdeviņos, jāiet uz baseinu vai citur, bet man pirms tam jāpastrādā, citādi nevaru sākt dienu. Nepārtrauktais darbs. Cenšos gan izrauties, apmeklēt radus vai koncertus, bet darbs ir prioritāte. Diemžēl tas droši vien arī "sausina" cilvēku.

Lasīju slavenā akadēmiķa Landau biogrāfiju, viņš esot piecos slēdzis laboratoriju, uzsējis šlipsi un gājis pie sievietēm

system. Currently, even leading cancer scientists, who received extremely generous grants in America have acknowledged their sins. Before retiring, they published two articles. One was [...published] in the very best magazine Cell, while the other [...appeared] in Nature, where they admitted that cancer is too complicated and we fail to appreciate this. In fact, the whole process of therapy that is based on elements and which is closely followed by pharmaceutical firms, because it confers "money, money", has no result. Cancer is too complicated. This prompted me to understand that there is no black and white; there is always uncertainty. And metastability, the ability to switch from one phase to another and to linger in the interim state is the main biological property of cancer. Does this seem interesting to you? It strikes me as being very interesting. I have to admit that I already understood this during my studies. It's simply a way of thinking.

What are your views on the role of analytical, rational capacities and intuition, creativity in scientific research?

A wise man once said that a discovery finds a prepared mind. Success does not occur of its own accord. A grant competition, in which five per cent will be ac-

vai uz teātri. Bet tas ir vienīgais tāds piemērs, ko zinu. Varbūt tā ir pareizi.

Kā jūsu zinātniskā izglītība un darbs ietekmē jūsu pasaules uztveri?

Cilvēks nevar būt pārāk kategorisks. Mans jaunais kolēģis ir romietis. Ļoti inteligents, gudrs. Man tomēr ir drusku padomju pagātne un dažkārt izlien kategorisms. Ja kas nav pareizi, tad steidzos to nosodīt. Viņš man ieteica būt humānākai, pieļaut, ka ir dažādi apstākļi. Mans japāņu kolēģis, ar kuru nupat publicējām darbu, ir ķertis uz savu lietu. Viņš mēdz mani nogurdināt, sūtot vairākas e-pasta vēstules dienā. Viņam raisās domas, vajag atbildēt, bet man ir citi darbi. Tad es atceros, ka viņam ir grūta situācija, jādabū pozīcija, man tas jāpieņem un jāpiedod viņa neadekvātums. Neteikšu, ka morāles robežas būtu izplūdušas, bet jāatzīst, ka cilvēki ir dažādi. Tā gan ir banalitāte.

Kāda ir dzīves jēga?

Arnis Rītups to jautā katrā savā intervijā. Vai jūs lasāt "Rīgas Laiku"? Man laika nav, bet izlasu.

Dzīves jēga? Es nezinu. Prieks no visa,

accepted, is, of course, a lottery. But as far as creativity is concerned; in the past decade, I've practically never stepped outside it. Before that... three children and a family, but now I fully devote myself to creative work. I wake up thinking about what I'm working on. I don't dream up solutions, but they tend to come to me in the morning. I don't know what you mean by analytical, but a discovery cannot be made without emotional input. Even a very big one. I don't know what it's like physiologically, but there has to be a high background, which a thought can climb. If there's no background, the thought will be smaller.

I have developed my own morning routine. I get up and sit down at my computer. My driver picks me up at half past eight; I have to go to the swimming pool or elsewhere, but before that I have to work; this is the only way I can start my day. Continual work. I do try to escape, to visit relatives or [...attend] concerts, but work is the priority. Unfortunately, this probably also makes a person a bit "dry".

I read a biography of the famous academician Landau. He's said to have closed his laboratory at five o'clock, put on a tie and visited women or gone to the theatre. But this is the only such example

ko dari... Dzīves, bērniem.

Dzīves jēga ir prieks.

that I know of. Maybe it's right.

How has your scientific education and work affected the way you look at the world?

A person should not be too categorical. My new colleague is a Roman. Very intelligent and clever. However, I have a bit of a Soviet past and sometimes my categorism emerges. If something is not right, I rush to condemn it. He suggested that I should be more humane; to accept that circumstances vary. My Japanese colleague, with whom we just published a thesis, is hooked on his work. He tends to tire me out, sending me several e-mails a day. Thoughts consume him; he needs replies, but I have other work [...to do]. Then I remember that he is in a difficult situation. He has to get a position. I have to accept this and forgive him his impropriety. I won't say that the boundaries of morality have been diffused, but one has to acknowledge that people are different. This, though, is banality.

What is the meaning of life?

Arnis Rītups asks this in each of his interviews. Do you read "Rīgas laiks"? I don't have the time, but I do read it.

*The meaning of life? I don't know. Joy
from everything you do... From life, chil-
dren...*

The meaning of life is joy.

Viena no 12 intervijām, kas tapušas, vācot materiālu Annas Salmanes, Kriša Salmaņa un Kristapa Pētersona skaņdarbam "Etīde" (2016).

One of twelve interviews that were conducted during the research for the sound piece "Study" (2016) by Anna Salmane, Krišs Salmanis and Kristaps Pētersons.

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Paldies! / *Thank you!*